

(PCT Article 36 and Rule 70)

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/011584

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-12 as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 1-39 received by this Authority on 11.08.2005 with letter of 09.08.2005
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- sheets 1/2, 2/2 as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-39	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-39	NO
Industrial applicability (IA)	Claims	1-39	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
D1: US 2004/220406 A1 (LANG ET AL.), 4 November 2004 (2004-11-04)			
D2: DE 199 33 850 A1 (BASF AG), 25 January 2001 (2001-01-25)			
D3: KAIBEL G: "DISTILLATION COLUMNS WITH VERTICAL PARTITIONS", CHEMICAL ENGINEERING AND TECHNOLOGY, WEINHEIM, DE, Vol. 10, 1987, pages 92-98, XP002939161, ISSN: 0930-7516			
D4: LESTAK ET AL.: "ADVANCES DISTILLATION SAVESE", CHEMICAL ENGINEERING, MCGRAW-HILL, ALBANY, NY, US, Vol. 7, July 1997 (1998-07), pages 72-76, XP001156299, ISSN: 0009-2460			
D5: SCHULTZ M A ET AL.: "REDUCE COSTS WITH DIVIDING-WALL COLUMNS", CHEMICAL ENGINEERING PROGRESS, AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, NEW YORK, US, Vol. 98, No. 5, May 2002 (2002-05), pages 64-71, XP001106017, ISSN: 0360-7275			
1. The present application relates to a method for separating ethylene amine-containing mixtures by distillation, the method being characterised in that separation is carried out in one or more dividing-wall columns. The ethylene amines to be			

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	<p>separated are ethylene diamine, piperazine, diethylene triamine, aminoethylethanol amine and/or monoethanol amine. The ethylene amine-containing mixture is a product obtained by reaction of MEOA with ammonia, followed by a partial or total separation of ammonia and water.</p> <p>2. D1 discloses a method for purifying triethylene diamine by distillation, in which separation is carried out in a dividing-wall column. The triethylene diamine-containing mixture is, in particular, piperazine, ethylpiperazine, triethylene diamine and aminoethylpiperazine (see the passages cited in the search report) (E document)</p> <p>3. D2 relates to a method for purifying triethylene diamine by fractionating distillation. The triethylene diamine-containing mixture is preferably obtained by reacting MEOA so as to produce a product which contains triethylene diamine and piperazine, then by reacting this product with an ethylating compound which contains at least one N and/or O atom (see the passages cited in the search report).</p> <p>4. D3-D5 disclose the advantages of the use of one or more dividing-wall columns for the distillative separation of mixtures which contain three or more components. Dividing-wall columns make it possible to obtain pure products by a simple, economical and efficient method. High-quality products with</p>

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	<p>regards to colour, colour stability, odour and purity are thus produced (see the passages cited in the search report).</p> <p>Novelty</p> <p>5. The subject matter of claims 1-39 is novel (PCT Article 33(2)). The prior art does not disclose a method for the distillative separation of ethylene amine-containing mixtures and characterised in that the separation is carried out in one or more dividing-wall columns (see paragraphs 3 and 4).</p> <p>Inventive step</p> <p>6. The subject matter of claims 1-39 does not involve an inventive step (PCT Article 33(3)).</p> <p>6.1 Methods for the <b>distillative separation of ethylene amine-containing mixtures</b> are known from the prior art (see D2).</p> <p>6.2 The subject matter of claims 1-39 differs from the known methods in that one or more dividing-wall columns are used, and in that the ethylene amines are ethylene diamine, piperazine, diethylene triamine, aminoethylethanol amine and/or monoethanol amine.</p> <p>6.3 D3 and D4 disclose <u>the advantages of the use of one or more dividing-wall columns for the distillative separation of mixtures which contain</u></p>

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	<p><u>three or more components</u>. Dividing-wall columns make it possible to obtain pure products by a simple, economical and efficient method. High-quality products with regard to colour, colour stability, odour and purity are thus produced.</p> <p>6.4 A person skilled in the art would therefore consider the inclusion of this feature, i.e. the use of <u>dividing-wall columns, in the method disclosed in D2, a conventional measure to improve the method described in D2 (separation of ethylene amine-containing mixtures)</u>.</p> <p>6.5 No inventive step (PCT Article 33(3)) is recognised in the subject matter of claims 1-39.</p> <p>Observations</p> <p>7. Claims 24, 26, 27, 30 and 36 do not meet the requirements of PCT Article 6 because the definition of the subject matter for which protection is sought is unclear. The claims attempt to define the subject matter in terms of the result to be achieved, and in doing so merely state the problem addressed, without indicating the technical features necessary to achieve this result.</p> <p>8. Contrary to PCT Rule 5.1(a)(ii), the description does not cite documents D2-D5 or indicate the relevant prior art disclosed therein.</p> <p>9. The description has not been brought into line with the amended claims.</p>

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